

Electromagnetic Hypersensitivity recognized as Disability by Sweden, Canada, European Union

[ELECTROMAGNETIC RADIATION SAFETY](#)

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Following is an excerpt from "Electromagnetic hypersensitivity means Peter Lloyd can't leave his house... or enjoy any modern pleasures inside" by Martin Shipton, *Wales Online*, Oct 16, 2014 ...

What is electromagnetic hypersensitivity?

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As early as the 1930s, however, EHS symptoms were observed in people working with radio and electricity, and with military radar in the 1940s.

Environmental EHS appeared in the general population from the 1970s with computers.

It increased in the 1980s with mobile and cordless phones, and with wifi from 2000.

Thousands of people are now linked with EHS support groups in 30 countries.

The first started in Sweden in 1989; the UK group began in 2003.

Sweden recognised EHS as a functional disability in 2002. The Canadian Human Rights Commission did likewise in 2007.

In 2009, the European Parliament voted for persons with EHS to be recognised as disabled.

Despite having official recognition, many doctors still know little or nothing about the condition.

<http://emfrefugee.blogspot.com/2014/10/electromagnetic-hypersensitivity-means.html>

Electromagnetic Radiation Safety

Scientific and policy developments regarding the health effects of electromagnetic radiation exposure from cell phones, cell towers, Wi-Fi, Smart Meters, and other wireless technology

Wednesday, May 6, 2020

[ELECTROMAGNETIC RADIATION SAFETY](#)

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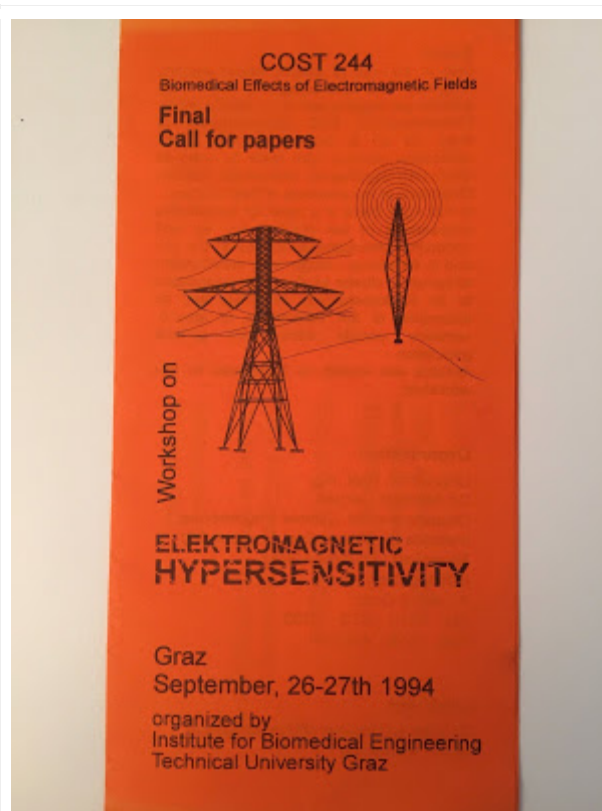
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Electromagnetic Hypersensitivity



Source: *Microwave News* Archive (Louis Slesin)

(See the end of this post for additional resources.)

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Following is an excerpt from "Electromagnetic hypersensitivity means Peter Lloyd can't leave his house... or enjoy any modern pleasures inside" by Martin Shipton, *Wales Online*, Oct 16, 2014:

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<http://bit.ly/211JeT7>

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Symptoms Experienced by Persons with Electromagnetic Hypersensitivity: Submissions to FCC Docket #13-84

This report summarizes the responses of 184 persons with self-reported electromagnetic hypersensitivity (EHS) who submitted comments to the FCC (Docket #13-84) and reported either their symptoms or the sources of their problematic exposure to radio frequency radiation.

<https://www.saferemr.com/2020/05/EHSsubmissionstoFCC.html>

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Electromagnetic hypersensitivity (EHS, microwave syndrome) – Review of mechanisms

Stein Y, Udassin IG. Electromagnetic hypersensitivity (EHS, microwave syndrome) – Review of mechanisms. Environmental Research. Vol 186. Available online 30 March 2020, 109445. <https://doi.org/10.1016/j.envres.2020.109445>

Abstract

Electromagnetic hypersensitivity (EHS), known in the past as “Microwave syndrome”, is a clinical syndrome characterized by the presence of a wide spectrum of non-specific multiple organ symptoms, typically including central nervous system symptoms, that occur following the patient's acute or chronic exposure to electromagnetic fields in the environment or in occupational settings.

Numerous studies have shown biological effects at the cellular level of electromagnetic fields (EMF) at magnetic (ELF) and radio-frequency (RF) frequencies in extremely low intensities. Many of the mechanisms described for Multiple Chemical Sensitivity (MCS) apply with modification to EHS. Repeated exposures result in sensitization and consequent enhancement of response. Many hypersensitive patients appear to have impaired detoxification systems that become overloaded by excessive oxidative stress. EMF can induce changes in calcium signaling cascades, significant activation of free radical processes and overproduction of reactive oxygen species (ROS) in living cells as well as altered neurological and cognitive functions and disruption of the blood-brain barrier. Magnetite crystals absorbed from combustion air pollution could have an important role in brain effects of EMF. Autonomic nervous system effects of EMF could also be expressed as symptoms in the cardiovascular system. Other common effects of EMF include effects on skin, microvasculature, immune and hematologic systems.

It is concluded that the mechanisms underlying the symptoms of EHS are biologically plausible and that many organic physiologic responses occur following EMF exposure. Patients can have neurologic, neuro-hormonal and neuro-psychiatric symptoms following exposure to EMF as a consequence of neural damage and over-sensitized neural responses.

More relevant diagnostic tests for EHS should be developed. Exposure limits should be lowered to safeguard against biologic effects of EMF. Spread of local and global wireless networks should be decreased, and safer wired networks should be used instead of wireless, to protect susceptible members of the public. Public places should be made accessible for electrosensitive individuals.

Mechanisms

Many of the mechanisms described for Multiple Chemical Sensitivity (MCS) apply with modification to EHS. Repeated exposures result in sensitization and consequent enhancement of response (Overstreet, 2001; Latremoliere and Woolf, 2009; Molot, 2013; Sage, 2015). Many hypersensitive patients appear to have impaired detoxification systems that become overloaded by excessive oxidative stress (Korkina, 2009; De Luca et al., 2014). Patients can have neurologic, neuro-hormonal and neuro-psychiatric symptoms following exposure to EMF as a consequence of neural damage and over-sensitized neural responses (Dwyer and Leeper, 1978; Pall, 2016). EMF can induce changes in calcium signaling cascades (Liboff, 1984; Blackman et al., 1985; Smith et al., 1987; Pall, 2013, 2015), significant activation of free radical processes and overproduction of reactive oxygen species (ROS) in living cells (Irmak et al., 2002; Zmyslony et al., 2004; Friedman et al., 2007; Blank and Goodman, 2009; De Iuliis et al., 2009; Georgiou, 2010; Avci et al., 2012; Jing et al., 2012; Bilgici et al., 2013; Burlaka et al., 2013) as well as altered neurological and cognitive functions (Frey, 1961; Thomas et al., 1986; Carrubba et al., 2007; Nittby et al., 2009; Xu et al., 2010; Molot, 2013; Yakymenko et al., 2016; Pall, 2016; Kim et al., 2017) and disruption of the blood-brain barrier (Salford et al., 2008; Nittby et al., 2009). Magnetite crystals absorbed from combustion air pollution could have an important role in brain effects of EMF (Maher et al., 2016).

Conclusions

In the modern world, exposure to electromagnetic radiation has become inescapable. There are many people who develop adverse health effects as a result of exposure to EMF. This review of the literature included numerous self-reported neurologic and neuropsychiatric symptoms which have a temporal relationship to EMF exposures. Further studies suggest that EMF exposure may be associated with changes in cerebral blood flow which correspond to abnormalities on PET scan of the brain. Some of the researchers have even localized the brain abnormalities to the temporal lobe, thought to be the closest site of exposure to cell phones. Because of the widespread use of EMF technology, it is difficult to avoid exposure.

<https://www.sciencedirect.com/science/article/abs/pii/S0013935120303388?via%3Dihub>

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Electrohypersensitivity as a Newly Identified and Characterized Neurologic Pathological Disorder: How to Diagnose, Treat, and Prevent It

Belpomme D, Irigaray P. Electrohypersensitivity as a Newly Identified and Characterized Neurologic

Abstract

Since 2009, we built up a database which presently includes more than 2000 electrohypersensitivity (EHS) and/or multiple chemical sensitivity (MCS) self-reported cases. This database shows that EHS is associated in 30% of the cases with MCS, and that MCS precedes the occurrence of EHS in 37% of these EHS/MCS-associated cases. EHS and MCS can be characterized clinically by a similar symptomatic picture, and biologically by low-grade inflammation and an autoimmune response involving autoantibodies against O-myelin. Moreover, 80% of the patients with EHS present with one, two, or three detectable oxidative stress biomarkers in their peripheral blood, meaning that overall these patients present with a true objective somatic disorder. Moreover, by using ultrasonic cerebral tomography and transcranial Doppler ultrasonography, we showed that cases have a defect in the middle cerebral artery hemodynamics, and we localized a tissue pulsometric index deficiency in the capsulo-thalamic area of the temporal lobes, suggesting the involvement of the limbic system and the thalamus. Altogether, these data strongly suggest that EHS is a neurologic pathological disorder which can be diagnosed, treated, and prevented. Because EHS is becoming a new insidious worldwide plague involving millions of people, we ask the World Health Organization (WHO) to include EHS as a neurologic disorder in the international classification of diseases.

Conclusions

In summary, we showed that there are presently sufficient clinical, biological, and radiological data for EHS to be acknowledged as a well-defined, objectively identified, and characterized pathological neurologic disorder. As a result, patients who self-report they suffer from EHS should be diagnosed and treated on the basis of presently available biological tests, including the detection of peripheral blood and urine biomarkers and the use of imaging techniques such as fMRI, TDU, and, when possible, UCTS. Moreover, because we showed for the first time that EHS is frequently associated with MCS and that both clinico-biological entities may be associated with a common physiopathological mechanism for genesis, it clearly appears that they can be identified as a unique neurologic pathological syndrome whatever their causal origin. Moreover, as it was shown that MCS genesis may be attributed to toxic chemical exposure, and EHS genesis to potentially excessive EMF and/or chemical exposure; protective measures against these two environmental stressors should be taken. Whatever its causal origin and mechanism of action, EHS should therefore be from now on recognized as a new identified and characterized neurological pathological disorder. As it is already a real health plague potentially involving millions of people worldwide it should be acknowledged by WHO, and thus be included in the WHO ICD. As stated during the international scientific consensus meeting on EHS and MCS that we have organized in 2015 in Brussels, scientists unanimously asked WHO to urgently assume its responsibilities, by classifying EHS and MCS as separate codes in the ICD; so as to increase scientific awareness of these two pathological entities in the medical community and the general public, and to foster research and train medical practitioners to efficiently diagnose, treat, and prevent EHS and MCS—which in fact constitute a unique, well-defined, and identifiable new neurologic disease.

Open access paper: <https://www.mdpi.com/1422-0067/21/6/1915>

Electrohypersensitivity (EHS) is an Environmentally-Induced Disability that Requires Immediate Attention

Havas M. Electrohypersensitivity (EHS) is an Environmentally-Induced Disability that Requires Immediate Attention. Review Article. J Sci Discov. 3(1):jsd18020; DOI:10.24262/jsd.3.1.18020. 2019.

Abstract

A growing number of countries are beginning to acknowledge that electrohypersensitivity (EHS) exists and a few countries have classified it as a disability or a functional impairment attributable to the environment. Epidemiological studies and in vivo experiments show that exposure to non-ionizing radiation (NIR) from extremely low to microwave frequency electromagnetic fields (EMF) at exposure intensities far below the maximum limits in international guidelines increases anxiety, depression, and physiological stress and impairs cognitive functions that include concentration, memory and learning. Furthermore, exposure to NIR contributes to neurodegenerative diseases including dementia, Alzheimer's disease, amyotrophic lateral sclerosis, multiple sclerosis, Parkinson's disease, attention deficit hyperactivity disorder and autism spectrum disorder. Exposure of the fetus to NIR (mobile phone) affects the neonatal heart and can lead to emotional and behavioral problems in human offspring. Similar exposures in laboratory studies report impaired cognitive performance, neuronal losses and pathological changes in the brain of rat offspring. The scientific and medical communities have repeatedly sent out urgent warnings, in the form of appeals, declarations and testimonies, that exposure to NIR needs to be reduced from a public health perspective. These warnings have been largely ignored. With continued development of wireless technology and the imminent roll out of new and densified technologies (e.g., 5G technology, satellite constellations, repeaters, wearables, Internet of Things), society will pay an enormous price for disregarding these warnings. It is long overdue for those responsible for public health, the health of children and health policy to take these warnings seriously and to provide a refuge for those afflicted by EHS. EHS is real, it is exacerbated by exposure to NIR, it is increasing among the population and when severe it becomes a disability. Action is long overdue to minimize exposure to NIR and to provide a safe environment that all can enjoy.

Conclusion

Environments contaminated by electrosmog can be devastating to those individuals who are already impaired by electromagnetic exposures. Unfortunately, these environments may also induce impairment in previously unimpaired individuals. Fetal exposure is particularly disturbing as it can affect the life of the offspring, as shown in both human and animal studies. The research reported here is regarding undesirable disruption of neurological and hormonal functions such that either cognitive or physical ability becomes impaired.

According to this research, exposure to EMF or EMR at levels far below the maximum limits in federal guidelines can contribute to deficits in memory and learning; increase the stress response and lead to mood disorders, including both anxiety and depression; contribute to symptoms of autism and attention deficit hyperactivity disorder; contribute to neurodegenerative disorders and exacerbate symptoms of

multiple sclerosis, amyotrophic lateral sclerosis, Parkinson's disease and various types of dementia, including Alzheimer's disease. Removal of the EMF/EMR exposure can ameliorate the impairing symptoms for many with EHS and/or reduce requirements for prescriptive medications and care. Mechanisms of action involve neurotransmitter disturbances, oxidative stress, programmed cell death (apoptosis), increase in stress proteins, reduced growth of nerve cells, DNA damage and altered hormonal levels.

With the impending deployment of 5G (5th Generation Wireless technology and the Internet of Things), exposure to mm [millimeter] waves will dramatically increase, further densifying our current electrosmog exposure.

Scientists and physicians familiar with EHS have submitted multiple appeals and declarations to governing agencies in an attempt to reduce exposure to electromagnetic frequencies. They recommend establishing more protective emission and exposure guidelines; designing technologies that emit EMR less often, at lower intensity and with a reduced radiation footprint; educating health care providers; informing the public; and establishing radiation-free environments for persons with EHS.

Agencies responsible for assuring disabled persons are included, and welcomed, in their communities and have equal access to necessities and enjoyment of life have provided little support for those suffering with EHS, presumably due to lack of information and/or unintentional, yet nevertheless in appropriate, attitudinal barriers. It is my hope that this document will encourage federal and state agencies, as well as other jurisdictions and decision-makers, to take EHS seriously and to help individuals affected by this physiological condition and to support their families. According to the World Health Organization (2015) the level of severity of EHS is classified as being severe for approximately 10% of individuals who report EHS symptoms. This percentage is likely to increase as more EMF-emitting technologies, such as 5G, mm waves and Internet of Things, are deployed.

Open access paper: <http://www.e-discoverypublication.com/wp-content/uploads/2019/03/JSD18020-final.pdf>

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Shielding methods and products against man-made Electromagnetic Fields: Protection versus risk

Panagopoulos DJ, Chrousos GP. Shielding methods and products against man-made Electromagnetic Fields: Protection versus risk. Sci Total Environ. 2019 Feb 23;667:255-262. doi: 10.1016/j.scitotenv.2019.02.344.

Highlights

- Human exposure to man-made EMFs has increased with increasing health problems.
- Metal shielding is lately suggested by private companies/individuals as a way to reduce exposure.
- Metal shielding reduces both man-made and natural atmospheric EMFs.
- EHS symptom relapses and internal desynchronization are reported after shielding.
- An avoidance strategy of man-made EMFs should be preferable than metal shielding.

Abstract

Human exposure to man-made Electromagnetic Fields (EMFs) has increased to unprecedented levels, accompanied by increase in various health problems. A connection has been indicated by an increasing number of studies. Symptoms characterized as Electro-hyper-sensitivity (EHS) are frequently reported especially in urban environments. Lately, people are advised by private companies and individuals to protect themselves from man-made EMFs by metal shielding through various products, for which there are reasonable concerns about their protective efficacy and safety. Indeed, any metal shielding practice, even when correctly applied, attenuates not only man-made totally polarized EMFs accused for the health problems, but also the natural non-polarized EMFs responsible for the biological rhythmicity and well-being of all animals. Strong evidence on this was provided by pioneering experiments in the 1960's and 1970's, with volunteers staying in a shielded underground apartment. We analyze the physical principles of EMF-shielding, the importance of natural atmospheric EMFs, and examine available shielding methods and suggested products, relying on science-based evidence. We suggest that an avoidance strategy is safer than shielding, and provide specific protection tips. We do not reject shielding in general, but describe ways to keep it at a minimum by intermittent use, as this is theoretically safer than extensive permanent shielding. We explain why metallic patches or "chips" or minerals claimed by sellers to be protective, do not seem to make sense and might even be risky. We finally suggest urgent research on the safety and efficacy of shielding methods combined with use of generators emitting weak pulses of similar frequency, intensity, and waveform with the natural atmospheric resonances.

<https://www.ncbi.nlm.nih.gov/pubmed/30831365>

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Individual variation in temporal relationships between RF exposure & physical symptoms: A new approach in studying 'electrosensitivity'

Bogers RP, van Gils A, Clahsen SCS, Vercrujssse W, van Kamp I, Baliatsas C, Rosmalen JGM, Bolte JFB. Individual variation in temporal relationships between exposure to radiofrequency electromagnetic fields and non-specific physical symptoms: A new approach in studying 'electrosensitivity'. *Environ Int.* 2018 Sep 15;121(Pt 1):297-307. doi: 10.1016/j.envint.2018.08.064.

Abstract

BACKGROUND: Everyday exposure to radiofrequency electromagnetic fields (RF-EMF) emitted from wireless devices such as mobile phones and base stations, radio and television transmitters is ubiquitous. Some people attribute non-specific physical symptoms (NSPS) such as headache and fatigue to exposure to RF-EMF. Most previous laboratory studies or studies that analyzed populations at a group level did not find evidence of an association between RF-EMF exposure and NSPS.

OBJECTIVES: We explored the association between exposure to RF-EMF in daily life and the occurrence

of NSPS in individual self-declared electrohypersensitive persons using body worn exposimeters and electronic diaries.

METHODS: We selected seven individuals who attributed their NSPS to RF-EMF exposure. The level of and variability in personal RF-EMF exposure and NSPS were determined during a three-week period. Data were analyzed using time series analysis in which exposure as measured and recorded in the diary was correlated with NSPS.

RESULTS: We found statistically significant correlations between perceived and actual exposure to wireless internet (WiFi - rate of change and number of peaks above threshold) and base stations for mobile telecommunications (GSM + UMTS downlink, rate of change) and NSPS scores in four of the seven participants. In two persons a higher EMF exposure was associated with higher symptom scores, and in two other persons it was associated with lower scores. Remarkably, we found no significant correlations between NSPS and time-weighted average power density, the most commonly used exposure metric.

CONCLUSIONS: RF-EMF exposure was associated either positively or negatively with NSPS in some but not all of the selected self-declared electrohypersensitive persons.

<https://www.ncbi.nlm.nih.gov/pubmed/30227317>

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Characteristics of perceived electromagnetic hypersensitivity in the general population

Gruber MJ, Palmquist E, Nordin S. Characteristics of perceived electromagnetic hypersensitivity in the general population. *Scand J Psychol*. 2018 May 9. doi: 10.1111/sjop.12449.

Abstract

Health problems evoked in the presence of electrical equipment is a concern, calling for better understanding for characteristics of electromagnetic hypersensitivity (EHS) in the general population. The present study investigated demographics, lifestyle factors, frequency and duration, coping strategies, proportion meeting clinical criteria for intolerance attributed to electromagnetic fields (EMF) and comorbidity. Using data from a large-scale population-based questionnaire study, we investigated persons with self-reported ($n = 91$) EHS in comparison to referents ($n = 3,250$). Middle age, female sex and poor perceived health was found to be associated with EHS. More than 50% in the EHS group reported having EMF-related symptoms more often than once a week, and the mean number of years experiencing EHS was 10.5. More than half of the EHS group reported that their symptoms started after a high-dose or long-term EMF exposure, that they actively tried to avoid EMF sources and that they mostly could affect the EMF environment. A minority of the EHS group had sought medical attention, been diagnosed by a physician or received treatment. Exhaustion syndrome, anxiety disorder, back/joint/muscle disorder, depression, functional somatic syndrome and migraine were comorbid with EHS. The results provide ground for future study of these characteristic features being risk factors for development of EHS and or consequences of EHS.

<https://www.ncbi.nlm.nih.gov/pubmed/29741795>

Hypersensitivity to electromagnetic waves: research efforts should be scaled up and suitable care provided for the people concerned

French Agency for Food, Environmental and Occupational Health & Safety (ANSES), March 27, 2018

Today the Agency is publishing the results of its expert appraisal on hypersensitivity to electromagnetic waves. This work drew on all the available scientific literature, as well as on numerous hearings with hospital and general practitioners, researchers, associations, and the people concerned. The expert appraisal revealed the great complexity of the issue of electrohypersensitivity (EHS), while concluding that according to the current state of knowledge, there is no solid experimental evidence establishing a causal link between exposure to electromagnetic fields and the symptoms described by the people declaring themselves as electrohypersensitive. The Agency also emphasised that the suffering and pain expressed by the people declaring themselves as electrohypersensitive is a reality of life, requiring them to adapt their daily lives to cope with it. In this context, the Agency recommends providing suitable care for the people concerned and pursuing research work, in particular by setting up studies whose experimental conditions take into account the circumstances of people declaring themselves as EHS.

Radiofrequency electromagnetic waves have been a major health, environmental and societal concern for several years now, in France and abroad. Despite the measures taken to regulate and monitor the levels of exposure to electromagnetic fields, for several decades the scientific literature has regularly reported cases of people suffering from various disorders attributed to exposure to fields emitted by household appliances, electrical facilities and communicating devices.

In this context, the Agency has published several opinions and collective expert appraisal reports, particularly in 2003, 2005, 2009, 2013 and, most recently, in 2016, on the potential health risks of exposure to radiofrequency waves. It also wished to pay due attention to the issue of electromagnetic hypersensitivity (EHS), by devoting a specific in-depth expert appraisal to this subject.

This expert appraisal, whose results are published today, was based on an analysis of the scientific literature and on numerous hearings (with hospital and general practitioners, researchers, associations and the people concerned). It was also supplemented with data based on more than 500 additional comments from scientists and stakeholders, in the framework of the open public consultation that ran from 27 July to 15 October 2016, and which was based on a preliminary expert appraisal report.

Agency conclusions and recommendations

The Agency's expert appraisal showed the great complexity of the issue of electrohypersensitivity. First of all, there are currently no validated diagnostic criteria for EHS, and the expert appraisal found that it is only possible to define EHS on the basis of self-reporting by individuals.

The Agency also concluded that the pain and suffering (headaches, sleep, attention and memory disorders, social isolation, etc.) expressed by the people declaring themselves as electrohypersensitive is a reality of life, requiring them to adapt their daily lives to cope with it.

The 40 experts, who worked on this expert appraisal for almost four years, investigated many hypotheses in an attempt to understand these symptoms. However, current scientific knowledge shows no cause and

effect relationship between the symptoms of people declaring themselves as electrohypersensitive and their exposure to electromagnetic waves. Nevertheless, these symptoms, which can have a significant impact on the quality of life of these people, require and warrant suitable care by health and social service players.

To this end, the Agency recommends asking the French National Authority for Health to consider the relevance of formulating recommendations for health professionals to ensure suitable care for people declaring themselves as electrohypersensitive. The Agency also recommends developing training for health professionals on the issue of electrohypersensitivity and training for social service professionals in supporting and counselling people declaring themselves as electrohypersensitive, as well as taking their questions and expectations into account in their practices and fostering greater coordination between the players involved in their care.

The Agency also recommends continuing research:

- by strengthening the interactions between scientists and associations of people declaring themselves as electrohypersensitive;
 - by supporting the establishment of research infrastructure suitable for investigating EHS, mainly in order to conduct long-term follow-up studies, while ensuring that the experimental conditions are controlled and take into account the circumstances of people declaring themselves as electrohypersensitive;
 - by securing long-term funding for research work on the health effects of radiofrequencies.
- <https://www.anses.fr/en/content/hypersensitivity-electromagnetic-waves-research-efforts-should-be-scaled-and-suitable-care>

Report (in French):

<https://www.anses.fr/en/system/files/AP2011SA0150Ra.pdf>

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Vital Signs with Dr. Sanjay Gupta

Dr. Sanjay Gupta, CNN's Chief Medical Correspondent, has produced a program on **Electromagnetic Hypersensitivity** which was aired on CNN International and on CNN in the U.S. in October and November, 2017.

You can watch the program online now by viewing the following three videos on the CNN website:

Part 1 (9-minute video): **Welcome to the National Quiet Zone** - with Diane Schou and Dr. David Carpenter. In a small West Virginia town, a restriction on wireless internet and phone signals provides a refuge to disconnect.

<http://cnn.it/2floP7A>

Part 2 (7-minute video): **Reducing Wireless Exposure** - with Dr. Joel Moskowitz, Melissa Chalmers, Kevin Mottus, and Dafna Tachover. As the world becomes more connected, how can you reduce your exposure to electromagnetic fields?

<http://cnn.it/2yBjBgB>

Part 3 (5-minute video): **Living in the National Quiet Zone** - with Leo Halepli. What life is like for a young man from Turkey now living in the small town of Green Bank, West Virginia.

<http://cnn.it/2wgekcD>

Note: Dr. Gupta's statement that non-ionizing radiation cannot cause DNA damage is false. The [National Toxicology Program](#) found that mice and rats exposed to non-ionizing, cell phone radiation developed DNA damage. [Numerous studies](#) have found evidence of DNA damage from exposure to low-intensity radiofrequency radiation (RFR). At least seven published studies have found evidence of DNA damage in humans. The DNA damage may be an indirect effect of the oxidative stress caused by exposure to RFR.

Discussion Questions:

Why doesn't our federal government conduct or fund research on electromagnetic hypersensitivity and other health effects (e.g., cancer, reproductive and neurological damage) associated with exposure to radio frequency radiation? The only major study the government has conducted in the past two decades, the National Toxicology Program study on second-generation (2G) cell phone radiation, was requested by the FDA in 1999 and still has not been finalized.

Why doesn't the Federal Communications Commission update its decades-old guidelines for radio frequency radiation exposure based upon the latest international research that finds biologic and health effects from current levels of exposure to radio frequency radiation?

Related Post:

[How does wireless radiation produce harmful health effects?](#)

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Mobile Phone Use and The Risk of Headache: A Systematic Review and Meta-analysis of Cross-sectional Studies

Wang J, Su H1, Xie W, Yu S. Mobile Phone Use and The Risk of Headache: A Systematic Review and

Abstract

Headache is increasingly being reported as a detrimental effect of mobile phone (MP) use. However, studies aimed to investigate the association between MP use and headache yielded conflicting results. To assess the consistency of the data on the topic, we performed a systematic review and meta-analysis of the available cross-sectional studies. Published literature from PubMed and other databases were retrieved and screened, and 7 cross-sectional studies were finally included in this meta-analysis. The pooled odds ratio (OR) and 95% confidence interval (CI) were calculated. We found that the risk of headache was increased by 38% in MP user compared with non-MP user (OR, 1.38; 95% CI, 1.18-1.61, $p < 0.001$). Among MP users, the risk of headache was also increased in those who had longer daily call duration (2-15 min vs. <2 min: OR, 1.62; 95% CI, 1.34-1.98, $p < 0.001$; >15 min vs. <2 min: OR, 2.50; 95% CI, 1.76-3.54, $p < 0.001$) and higher daily call frequency (2-4 calls vs. <2 calls: OR, 1.37; 95% CI, 1.07-1.76, $p < 0.001$; >4 calls vs. <2 calls: OR, 2.52; 95% CI, 1.78-3.58, $p < 0.001$). Our data indicate that MP use is significantly associated with headache, further epidemiologic and experimental studies are required to affirm and understand this association.

Excerpts

The underlying mechanism of the association between MP use and headache remains unclear but some suggest that breakdown of the blood-brain barrier due to exposure to low intensity MP frequency microwave energy may be involved 33,34,35,36. Also, the dopamine-opiate system may be involved in headaches and low intensity electromagnetic energy exposure affects those systems 37,38,39. However, since Frey's group first reported headaches occurring after microwave energy exposure at approximately the same frequencies and incident energies that present day MP emit⁴⁰, the exact mechanism under this association is still not fully understood now.

The results of our meta-analysis and lots of previous studies herein supported current clinical opinion that MP use may cause increased risk for headache. Therefore, it is advisable to admit that the use of MP is a risk factor for headache. In Stalin's study 18 and Chiu's study 19, the prevalence of MP usage among adult and children was 69.8% and 63.2% respectively in their study population, and that was only the data from two years ago. We could foresee the prevalence of MP usage will be higher in the future. So it is also advisable to suggest that excessive use of MP should be avoided by increasing social awareness through health promotion activities. It is imperative that health care professionals, clinicians and common people are educated about the deleterious influence of MP on headache. And it is reasonable to instruct children and adolescent about a prudent use of MPs. In addition, we encourage screening of headache patients during routine clinical visits to identify those patients to explore excessive MP use as a potential cause. Intervention and policies must be developed, evaluated and carry out at the population level to raise the awareness of the potential adverse health effect to decrease the headache caused by MP using.

Open Access Paper: <https://www.nature.com/articles/s41598-017-12802-9>

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**Special Issue on Ecopsychology and Environmental Sensitivities:
Chemical, Electrical, and Beyond**

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EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses

Belyaev I, Dean A, Eger H, Hubmann G, Jandrisovits R, Kern M, Kundi M, Moshhammer H, Lercher P, Müller K, Oberfeld G, Ohnsorge P, Pelzmann P, Scheingraber C, Thill R. EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses. Rev Environ Health. Publ online 2016 Jul 25. doi: 10.1515/reveh-2016-0011.

Abstract

Chronic diseases and illnesses associated with unspecific symptoms are on the rise. In addition to chronic stress in social and work environments, physical and chemical exposures at home, at work, and during leisure activities are causal or contributing environmental stressors that deserve attention by the general practitioner as well as by all other members of the health care community. It seems certainly necessary now to take "new exposures" like electromagnetic field (EMF) into account. Physicians are increasingly confronted with health problems from unidentified causes.

Studies, empirical observations, and patient reports clearly indicate interactions between EMF exposure and health problems. Individual susceptibility and environmental factors are frequently neglected. New wireless technologies and applications have been introduced without any certainty about their health effects, raising new challenges for medicine and society. For instance, the issue of so-called non-thermal effects and potential long-term effects of low-dose exposure were scarcely investigated prior to the introduction of these technologies. Common EMF sources include Wi-Fi access points, routers and clients, cordless and mobile phones including their base stations, Bluetooth devices, ELF magnetic fields from net currents, ELF electric fields from electric lamps and wiring close to the bed and office desk. On the one hand, there is strong evidence that long-term-exposure to certain EMF exposures is a risk factor for diseases such as certain cancers, Alzheimer's disease and male infertility. On the other hand, the emerging electromagnetic hypersensitivity (EHS) is more and more recognized by health authorities, disability administrators and case workers, politicians, as well as courts of law.

We recommend treating EHS clinically as part of the group of chronic multisystem illnesses (CMI) leading to a functional impairment (EHS), but still recognizing that the underlying cause remains the environment. In the beginning, EHS symptoms often occur only occasionally, but

over time they may increase in frequency and severity. Common EHS symptoms include headaches, concentration difficulties, sleeping problems, depression, lack of energy, fatigue and flu-like symptoms.

A comprehensive medical history, which should include all symptoms and their occurrences in spatial and temporal terms and in the context of EMF exposures, is the key to the diagnosis. The EMF exposure can be assessed by asking for typical sources like Wi-Fi access points, routers and clients, cordless and mobile phones and measurements at home and at work. It is very important to take the individual susceptibility into account.

The primary method of treatment should mainly focus on the prevention or reduction of EMF exposure, that is, reducing or eliminating all sources of EMF at home and in the workplace. The reduction of EMF exposure should also be extended to public spaces such as schools, hospitals, public transport, and libraries to enable persons with EHS an unhindered use (accessibility measure). If a detrimental EMF exposure is reduced sufficiently, the body has a chance to recover and EHS symptoms will be reduced or even disappear. Many examples have shown that such measures can prove effective. Also the survival rate of children with leukemia depends on ELF magnetic field exposure at home.

To increase the effectiveness of the treatment, the broad range of other environmental factors that contribute to the total body burden should also be addressed. Anything that supports a balanced homeostasis will increase a person's resilience against disease and thus against the adverse effects of EMF exposure. There is increasing evidence that EMF exposure has a major impact on the oxidative and nitrosative regulation capacity in affected individuals. This concept also may explain why the level of susceptibility to EMF can change and why the number of symptoms reported in the context of EMF exposures is so large. Based on our current understanding, a treatment approach that minimizes the adverse effects of peroxynitrite - as has been increasingly used in the treatment of multisystem disorders - works best.

This EMF Guideline gives an overview of the current knowledge regarding EMF-related health risks and provides concepts for the diagnosis and treatment and accessibility measures of EHS to improve and restore individual health outcomes as well as for the development of strategies for prevention.

<http://bit.ly/2asNTuj>

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Electrohypersensitivity: a functional impairment due to an inaccessible environment

Johansson O. Electrohypersensitivity: a functional impairment due to an inaccessible environment. Rev Environ Health. 2015 Dec 1;30(4):311-21. doi: 10.1515/reveh-2015-0018.

Abstract

In Sweden, electrohypersensitivity is recognized as a functional impairment which implies only the environment as the culprit. The Swedish view provides persons with this impairment a maximal legal protection, it gives them the right to get accessibility measures for free, as well as governmental subsidies and municipality economic support, and to provide them with special Ombudsmen (at the municipality, the EU, and the UN level, respectively), the right and economic means to form disability organizations and allow these to be part of national and international counterparts, all with the simple and single aim to allow persons with the functional impairment electrohypersensitivity to live an equal life in a society based on equality. They are not seen as patients, they do not have an overriding medical diagnosis, but the 'patient' is only the inferior and potentially toxic environment. This does not mean that a subjective symptom of a functionally impaired can not be treated by a physician, as well as get sick-leave from their workplace as well as economic compensation, and already in the year 2000 such symptoms were identified in the Internal Code of Diagnoses, version 10 (ICD-10; R68.8/now W90), and have been since. But the underlying cause still remains only the environment.

<http://1.usa.gov/1YFwzkd>

Excerpts

The very first case may have been Nikola Tesla (10 July 1856–7 January 1943) a Serbian-American inventor, electrical engineer, mechanical engineer, physicist, and futurist, best known for his contributions to the design of the modern alternating current (AC) electricity supply system. Descriptions of his health status closely resembles what we today would have named electro-hypersensitivity. A surge of similar case reports were also seen during the amateur radio (DX) years.

In more recent times, as early as in the 1970s, a report from the former Soviet Union described a “microwave syndrome”. The Soviet military recognized early on the possible side-effects from radar and radio radiation. This microwave syndrome was seen in up to a quarter of the military personnel working with radio and radar equipment. They showed symptoms such as fatigue, dizziness, headaches, problems with concentration and memory, sleep disturbances, and being hot tempered. The treatment suggested was a change of assignments and to keep away from exposure. Rest, physical exercise, and nutritious food were also offered (8).

Also in the 1970s the newspaper industry was one of the first to supply it's employees with personal computers using visual display terminals. Complaints of headaches and visual problems, as well as clusters of miscarriages and birth defects in children born to female editors and other newspaper employees, generated some publicity. In addition, many people who worked in the electronics industry in Sweden, including an estimated 12% of the electrical engineers in that industry, became electrically sensitive, and helped form the current Swedish disability organization ...

In the United States, then-Representative Al Gore held Congressional hearings in 1981 on the health effects of computer screens

Today the most famous electrohypersensitive person is Gro Harlem Brundtland (20 April 1939), the former Prime Minister of Norway and the former Director General of the UN World Health Organization (WHO).

I and my collaborator, Dr. Shabnam Gangi, in two papers of theoretical nature (27, 28), have put forward a model for how mast cells and substances secreted from them (e.g. histamine, heparin, and serotonin) could explain sensitivity to electromagnetic fields...

When it comes to functional impairments, it is always only action that speaks, nothing else. To ensure that everyone acts within the UN Human Rights Convention is of paramount importance, and that persons with EHS is promptly given complete accessibility is the only acceptable goal, as is proper symptom identification and treatment when possible, but only when asked for by the disabled person Himself/Herself. However, the latter should never be used instead of the first.

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Biomarkers for diagnosing electrohypersensitivity & multiple chemical sensitivity: Two etiopathogenic aspects of a unique pathological disorder

Belpomme D, Campagnac C, Irigaray P. Reliable disease biomarkers characterizing and identifying electrohypersensitivity and multiple chemical sensitivity as two etiopathogenic aspects of a unique pathological disorder. Rev Environ Health. 2015 Dec 1;30(4):251-71. doi: 10.1515/reveh-2015-0027.

Abstract

Much of the controversy over the causes of electro-hypersensitivity (EHS) and multiple chemical sensitivity (MCS) lies in the absence of both recognized clinical criteria and objective biomarkers for widely accepted diagnosis.

Since 2009, we have prospectively investigated, clinically and biologically, 1216 consecutive EHS and/or MCS-self reporting cases, in an attempt to answer both questions. We report here our preliminary data, based on 727 evaluable of 839 enrolled cases: 521 (71.6%) were diagnosed with EHS, 52 (7.2%) with MCS, and 154 (21.2%) with both EHS and MCS. Two out of three patients with EHS and/or MCS were female; mean age (years) was 47. As inflammation appears to be a key process resulting from electromagnetic field (EMF) and/or chemical effects on tissues, and histamine release is potentially a major mediator of inflammation, we systematically measured histamine in the blood of patients. Near 40% had an increase in histaminemia (especially when both conditions were present), indicating a chronic inflammatory response can be detected in these patients. Oxidative stress is part of inflammation and is a key contributor to damage and response. Nitrotyrosin, a marker of both peroxynitrite (ONOO⁻) production and opening of the blood-brain barrier (BBB), was increased in 28% of the cases. Protein S100B, another marker of BBB opening was increased in 15%. Circulating autoantibodies against O-myelin were detected in 23%, indicating EHS and MCS may be associated with autoimmune response. Confirming animal experiments showing the increase of Hsp27 and/or Hsp70 chaperone proteins under the influence of EMF, we found increased Hsp27 and/or Hsp70 in 33% of the patients. As most patients reported chronic insomnia and fatigue, we determined the 24 h urine 6-hydroxymelatonin sulfate (6-OHMS)/creatinin ratio and found it was decreased (<0.8) in all investigated cases. Finally, considering the self-reported symptoms of EHS and MCS, we serially measured the brain blood flow (BBF) in the temporal lobes of each case with pulsed cerebral ultrasound computed tomography. Both disorders were associated with hypoperfusion in the capsulothalamic area, suggesting that the inflammatory process involves the limbic system and the thalamus.

Our data strongly suggest that EHS and MCS can be objectively characterized and routinely diagnosed by commercially available simple tests. Both disorders appear to involve inflammation-related hyper-histaminemia, oxidative stress, autoimmune response, capsulothalamic hypoperfusion and BBB opening, and a deficit in melatonin metabolic availability; suggesting a risk of chronic neurodegenerative disease. Finally the common co-occurrence of EHS and MCS strongly suggests a common pathological mechanism.

<http://1.usa.gov/1NEtsXW>

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The microwave syndrome or electro-hypersensitivity: historical background

Carpenter DO. The microwave syndrome or electro-hypersensitivity: historical background. Rev Environ Health. 2015 Nov 10. doi: 10.1515/reveh-2015-0016. [Epub ahead of print]

Abstract

Microwave generating equipment first became common during World War 2 with the development of radar. Soviet bloc countries reported that individuals exposed to microwaves

frequently developed headaches, fatigue, loss of appetite, sleepiness, difficulty in concentration, poor memory, emotional instability, and labile cardiovascular function, and established stringent exposure standards. For a variety of reasons these reports were discounted in Western countries, where the prevailing belief was that there could be no adverse health effects of electromagnetic fields (EMFs) that were not mediated by tissue heating. The reported Soviet effects were at lower intensities than those that cause heating. However, there were several accidental exposures of radar operators in Western countries that resulted in persistent symptoms similar to those described above. The Soviets irradiated the US Embassy in Moscow with microwaves during the period 1953-1975, and while no convincing evidence of elevated cancer rates was reported, there were reports of "microwave illness." Officials passed these complaints off as being due to anxiety, not effects of the microwave exposure. There is increasing evidence that the "microwave syndrome" or "electro-hypersensitivity" (EHS) is a real disease that is caused by exposure to EMFs, especially those in the microwave range. The reported incidence of the syndrome is increasing along with increasing exposure to EMFs from electricity, WiFi, mobile phones and towers, smart meters and many other wireless devices. Why some individuals are more sensitive is unclear. While most individuals who report having EHS do not have a specific history of an acute exposure, excessive exposure to EMFs, even for a brief period of time, can induce the syndrome.

<http://1.usa.gov/1HDPOWI>

Excerpts

Electro-hypersensitivity (EHS) is a syndrome that may include some or all of the following: excessive fatigue, headache, tinnitus, insomnia, photophobia, a feeling of cognitive dysfunction and impaired memory, irritability, pain at various sites and often cardiovascular abnormalities (1). However, these are all relatively common complaints. All of us have on occasion suffered from headaches and insomnia. Because the symptoms are relatively non-specific, and because the adverse health effects of electromagnetic fields (EMFs) is a contentious issue, and also because primary care physicians have no objective diagnostic algorithms by which to diagnose EHS, patients suffering from EHS are often referred to a psychiatrist. There is, however, a body of evidence, both old and more recent, that indicates that these symptoms are triggered by exposure to EMFs in sensitive individuals. This is the case for exposure to both the extra low electromagnetic fields (ELF) coming from electricity and the radiofrequency (RF) EMFs coming from radar, communication devices, WiFi, smart meters and many other forms of wireless devices.

There are conflicting estimates on what percent of the population suffers from EHS, with some suggesting that between 5 and 10% of people have the syndrome, and that the incidence is increasing with time (2). However, there are several reports of tests of individuals taken into a laboratory and their responses recorded when they were unaware of whether or not an EMF field was being applied. Some of these studies have not shown that individuals who report that they are electro-sensitive are in fact able to discern if the EMFs are present or not (3–6). However, these reports are balanced by others that show that at least some individuals do

respond with adverse symptoms when exposed to EMFs in a blinded fashion (7, 8). Thus not everyone who believes they are electrosensitive really is, but it is also likely that some have the symptoms of EHS but have not identified the cause. Thus the true incidence of EHS is currently not known.

... the Soviet countries' standard for maximal permissible [EMF] exposure during the workday is 1,000 times lower than that in the US. [0.01 mW/cm² over an entire workday]

Some of the strongest evidence that EHS is a real syndrome comes from cases of acute high intensity exposure to microwaves of healthy people, which resulted in prolonged illness

Recent years have seen a marked increase in overall exposure to EMFs There has always been uncertainty over which characteristics of EMFs are most important with regard to human health effects. Because the mechanisms whereby these various adverse health outcomes arise are still not well understood, it is important to ask the question of which components pose the greatest risk, whether or not we are confident of the answer. Frey (36, 37) first suggested that peak power density was more important than average power density. Litovitz et al. (38) concluded that 60 Hz EMFs and RF EMFs do very much the same things, and later studies suggested that the low frequency, modulatory component of RF was particularly important (39). Others have implicated on-off transients, "dirty electricity" and other characteristics of the fields than the steady 50 or 60 Hz fields.

... smart meter RF radiation is significantly different from many other forms of RF, in that it consists of brief but very high intensity pulses. Thus, whereas the average exposure over time is not excessive it appears possible that the high intensity pulses are responsible for the development of EHS. Brief intense pulses have been described as "dirty electricity" by Milham and Morgan (33), who suggest that many of the reported adverse effects of EMFs are due to these brief events, rather than the sine wave forms ...

Conclusion

The weight of evidence indicates that EHS is a real syndrome induced by exposure to either ELF or RF EMF. In some cases it results from a brief, high intensity exposure, whereas in others it appears to reflect ambient exposures, especially those of increasing intensity and perhaps of certain waveforms. Whether from acute high intensity exposure or ambient background exposure from cell towers, mobile phones, smart meters and other devices, it is clear that not everyone develops EHS, for reasons not well understood. Certainly more research is needed to understand exactly which of the components of EMF exposures pose the greatest danger to human health, and what biological mechanisms are responsible. But the important

conclusion is that there is something about EMFs of various forms that do pose direct hazards to human health.

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Electromagnetic Hypersensitivity (EHS): Fad Allergy, Debilitating Disease, or What?

The National Law Review, Oct 15, 2015

"... electromagnetic hypersensitivity (or "EHS" – sensitivity to radio waves from Wi-Fi routers, cell phones and similar products) is an "allergy" that has recently gotten more mainstream media attention and is also "characterized by a range of non-specific symptoms." The Access Board, which is the federal agency responsible for promulgating accessibility guidelines under the Americans with Disabilities Act, has recognized that "electromagnetic sensitivities may be considered disabilities under the ADA"

<snip>

"The upshot of court rulings to date is that while some courts will overlook the lack of scientific evidence that EHS is caused by exposure to EMF in the context of government benefits, they have not been so accommodating where another individual's (or company's) rights would be adversely affected by a ruling in favor of an EHS plaintiff."

"If EHS becomes as prevalent as "gluten sensitivity," we can expect more EHS sufferers to ask courts to fashion them a remedy. Unlike bread and pasta for the gluten-obsessed, EMF is not something a person can easily avoid. Americans are exposed to EMF on a daily basis, from the likes of garage door openers, cell phones, cordless phones, laptops, tablets, to Wi-Fi routers in their homes, supermarkets, malls and places of work. Radio frequency energy is literally everywhere. While there is no science to support the causation hypothesis, people who believe they have EHS *really believe* they have a legitimate sensitivity, and many have demonstrable symptoms that are not frivolous. That makes for motivated litigants, which means the courts will probably see more of these cases in the future. But for courts to decide that EHS is something more than a fad allergy, or a psychological manifestation arising from the nocebo effect, they will need controlled scientific studies supporting the case—studies that at the moment do not exist."

Complete article: <http://bit.ly/1VUUvg8>

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2015 International Scientific Declaration on Electromagnetic Hypersensitivity and Multiple Chemical Sensitivity

ARTAC / ECERI Press Release, Sep 4, 2015

Following the **fifth Paris Appeal Congress**, which took place on the 18th of May, 2015 and focused on environmental hypersensitivities, the attending European, American and Canadian scientists unanimously decided to create a working group and to write a Common International Declaration to request an official recognition of these new diseases and of their sanitary consequences worldwide.

The declaration calls upon national and international bodies and institutions and particularly the World Health Organization, **for taking urgently their responsibility for recognizing electrohypersensitivity and multiple chemical sensitivity as real diseases, including them in the International Classification of Diseases.**

This International Declaration also asks national and international institutions to adopt simple precautionary measures of prevention, to inform populations and **requires the appointment of real independent expert groups to evaluate these sanitary risks in total scientific objectivity**, which is not the case today.

For the Scientific Committee of the Paris Appeal Fifth Congress:

Pr. David Carpenter, MD (USA)

Pr. Lennart Hardell, MD, PhD (Sweden)

Pr. Dominique Belpomme, MD, MS (France)

Brussels International Scientific Declaration : www.appel-de-paris.com

To download the Declaration: <http://bit.ly/ehsDeclaration>

To download the Program of the Congress: <http://bit.ly/ParisEHSappeal2>

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Ex-WHO General-Director Warns: "Wireless Technology has Health Effects There is no Doubt "

YouTube, Aug 20, 2015 (3:20)

On August 14, 2015, retired General-Director of the World Health Organization and former Prime Minister of Norway, Dr. Gro Harlem Brundtland, was interviewed by the Norwegian newspaper [Aftenposten](#).

One issue discussed in the interview was her current thoughts about wireless radiation. Her statement was crystal clear. Watch the relevant clip from the interview here, subtitled in English by Citizens' Radiation Protection, Norway.

<http://bit.ly/1hykTzF>

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What does the World Health Organization say about EHS?

The EHS overview on the World Health Organization's web site is nine years old. When will the WHO inform the public about the world-wide program of EMF studies on EHS it is co-ordinating?

Electromagnetic fields and public health: Electromagnetic hypersensitivity

Backgrounder, World Health Organization, December 2005

<snip>

What WHO is doing

WHO, through its International EMF Project, is identifying research needs and co-ordinating a world-wide program of EMF studies to allow a better understanding of any health risk associated with EMF exposure. Particular emphasis is placed on possible health consequences of low-level EMF. Information about the EMF Project and EMF effects is provided in a series of fact sheets in several languages www.who.int/emf/.

<http://www.who.int/peh-emf/publications/facts/fs296/en/>

Resources

Hypersensitivity to WiFi ... Could it be a disability?

Alexis Kramer. Hypersensitivity to WiFi ... Could it be a disability? Bloomberg BNA. Sep 10, 2015. <http://www.bna.com/hypersensitivity-wifi-disability-b17179935773/>

On Sept. 1, a federal district court in Florida refused to dismiss an [ADA claim](#) based on allegations that an individual experienced insomnia, loud and violent ear ringing and difficulty concentrating as a result of the attachment of a digital meter to his home.

The court said that because these symptoms substantially limited major life activities and derived from "some sort of physical or mental impairment," it could reasonably infer that the plaintiff has a disability.

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Electromagnetic hypersensitivity -- an increasing challenge to the medical profession

Hedendahl L, Carlberg M, Hardell L. Electromagnetic hypersensitivity - an increasing challenge to the medical profession. Rev Environ Health. 2015;30(4):209-15.

Abstract

BACKGROUND: In 1970, a report from the former Soviet Union described the "microwave syndrome" among military personnel, working with radio and radar equipment, who showed

symptoms that included fatigue, dizziness, headaches, problems with concentration and memory, and sleep disturbances. Similar symptoms were found in the 1980s among Swedes working in front of cathode ray tube monitors, with symptoms such as flushing, burning, and tingling of the skin, especially on the face, but also headaches, dizziness, tiredness, and photosensitivity. The same symptoms are reported in Finns, with electromagnetic hypersensitivity (EHS) being attributed to exposure to electromagnetic fields (EMF). Of special concern is involuntary exposure to radiofrequency (RF)-EMF from different sources. Most people are unaware of this type of exposure, which has no smell, color, or visibility. There is an increasing concern that wireless use of laptops and iPads in Swedish schools, where some have even abandoned textbooks, will exacerbate the exposure to EMF.

METHODS: We have surveyed the literature on different aspects of EHS and potential adverse health effects of RF-EMF. This is exemplified by case reports from two students and one teacher who developed symptoms of EHS in schools using Wi-Fi.

RESULTS: In population-based surveys, the prevalence of EHS has ranged from 1.5% in Sweden to 13.3% in Taiwan. Provocation studies on EMF have yielded different results, ranging from where people with EHS cannot discriminate between an active RF signal and placebo, to objectively observed changes following exposure in reactions of the pupil, changes in heart rhythm, damage to erythrocytes, and disturbed glucose metabolism in the brain. The two students and the teacher from the case reports showed similar symptoms, while in school environments, as those mentioned above.

DISCUSSION: Austria is the only country with a written suggestion to guidelines on the diagnosis and treatment of EMF-related health problems. Apart from this, EHS is not recognized as a specific diagnosis in the rest of the world, and no established treatment exists.

CONCLUSION: It seems necessary to give an International Classification of Diseases to EHS to get it accepted as EMF-related health problems. The increasing exposure to RF-EMF in schools is of great concern and needs better attention. Longer-term health effects are unknown. Parents, teachers, and school boards have the responsibility to protect children from unnecessary exposure.

From: The Fifth Congress of the Paris Appeal: Environmental idiopathic intolerance: what role for EMFs and multiple chemicals? 18 May 2015, Brussels, Belgium.

Conclusions

The prevalence of EHS seems to be increasing today, and many people get symptoms when exposed to ELF- and/or RF-EMF. With the ever more extensive use of wireless technologies, nobody can avoid being exposed. It is important to work toward getting objective diagnostic criteria for EHS, and have it recognized and officially accepted as hypersensitivity, an illness caused by exposure to EMF. Thus, it is necessary to give an International Classification of Diseases to EHS. If and when EHS is accepted as a diagnosis by society and the medical

profession, measures can be taken especially in consideration for this group of people with EHS regarding healthcare, accommodation, school, and work.

Measurements of exposure to EMF should be performed in classrooms and in school yards during a typical school week. The results must be evaluated in relation to current knowledge of biological effects from EMF exposure. This should lead to a precautionary approach using wired solution of the internet connection, but also reduction of other sources of EMF exposure. This approach should be similar as for control of exposure to other toxic agents such as asbestos and radon emissions. It is time to consider ELF-EMF and RF-EMF as environmental pollutants that need to be controlled.

<https://www.ncbi.nlm.nih.gov/pubmed/26372109>

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Implications of non-linear biological oscillations on human electrophysiology for EHS and MCS

Sage C. The implications of non-linear biological oscillations on human electrophysiology for electrohypersensitivity (EHS) and multiple chemical sensitivity (MCS). Rev Environ Health. 2015 Sep 12.

Abstract

The 'informational content' of Earth's electromagnetic signaling is like a set of operating instructions for human life. These environmental cues are dynamic and involve exquisitely low inputs (intensities) of critical frequencies with which all life on Earth evolved. Circadian and other temporal biological rhythms depend on these fluctuating electromagnetic inputs to direct gene expression, cell communication and metabolism, neural development, brainwave activity, neural synchrony, a diversity of immune functions, sleep and wake cycles, behavior and cognition. Oscillation is also a universal phenomenon, and biological systems of the heart, brain and gut are dependent on the cooperative actions of cells that function according to principles of non-linear, coupled biological oscillations for their synchrony. They are dependent on exquisitely timed cues from the environment at vanishingly small levels. Altered 'informational content' of environmental cues can swamp natural electromagnetic cues and result in dysregulation of normal biological rhythms that direct growth, development, metabolism and repair mechanisms. Pulsed electromagnetic fields (PEMF) and radiofrequency radiation (RFR) can have the devastating biological effects of disrupting homeostasis and desynchronizing normal biological rhythms that maintain health. Non-linear, weak field biological oscillations govern body

electrophysiology, organize cell and tissue functions and maintain organ systems. Artificial bioelectrical interference can give false information (disruptive signaling) sufficient to affect critical pacemaker cells (of the heart, gut and brain) and desynchronize functions of these important cells that orchestrate function and maintain health. Chronic physiological stress undermines homeostasis whether it is chemically induced or electromagnetically induced (or both exposures are simultaneous contributors). This can eventually break down adaptive biological responses critical to health maintenance; and resilience can be compromised. Electrohypersensitivity can be caused by successive assaults on human bioelectrochemical dynamics from exogenous electromagnetic fields (EMF) and RFR or a single acute exposure. Once sensitized, further exposures are widely reported to cause reactivity to lower and lower intensities of EMF/RFR, at which point thousand-fold lower levels can cause adverse health impacts to the electrosensitive person. Electrohypersensitivity (EHS) can be a precursor to, or linked with, multiple chemical sensitivity (MCS) based on reports of individuals who first develop one condition, then rapidly develop the other. Similarity of chemical biomarkers is seen in both conditions [histamines, markers of oxidative stress, auto-antibodies, heat shock protein (HSP), melatonin markers and leakage of the blood-brain barrier]. Low intensity pulsed microwave activation of voltage-gated calcium channels (VGCCs) is postulated as a mechanism of action for non-thermal health effects.

<https://www.ncbi.nlm.nih.gov/pubmed/26368042>

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Does electromagnetic hypersensitivity originate from nocebo responses? Indications from a qualitative study

Dieudonné M. Does electromagnetic hypersensitivity originate from nocebo responses? Indications from a qualitative study. Bioelectromagnetics. 2015 Sep 15. doi: 10.1002/bem.21937. [Epub ahead of print]

Abstract

Idiopathic Environmental Intolerance attributed to Electromagnetic Fields (IEI-EMF) is a condition in which symptoms are attributed to electromagnetic field (EMF) exposure. As electrohypersensitive (EHS) people have repeatedly been observed, during provocation trials, to report symptoms following perceived rather than actual exposure, the hypothesis has been put forward that IEI-EMF originates from psychological mechanisms, especially nocebo responses. This paper examines this hypothesis, using data from a qualitative study aimed at understanding how EHS people come to regard themselves as such.

Forty self-diagnosed EHS people were interviewed.

A typified model of their attribution process was then elaborated, inductively, from their narratives. This model is linear and composed of seven stages: (1) onset of symptoms; (2) failure to find a solution; (3) discovery of EHS; (4) gathering of information about EHS; (5) implicit appearance of conviction; (6) experimentation; (7) conscious acceptance of conviction.

Overall, symptoms appear before subjects start questioning effects of EMF on their health, which is not consistent with the hypothesis that IEI-EMF originates from placebo responses to perceived EMF exposure. However, such responses might occur at the sixth stage of the process, potentially reinforcing the attribution. It remains possible that some cases of IEI-EMF originate from other psychological mechanisms.

<https://www.ncbi.nlm.nih.gov/pubmed/26369906>

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Metabolic and Genetic Screening of Electromagnetic Hypersensitive Subjects as a Feasible Tool for Diagnostics and Intervention

De Luca et al 2014. Metabolic and Genetic Screening of Electromagnetic Hypersensitive Subjects as a Feasible Tool for Diagnostics and Intervention. Mediators of Inflammation. Volume 2014, Article ID 924184. Open Access <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4000647/pdf/MI2014-924184.pdf>

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This West Virginia Town Has Gone Radio Silent: Greetings from the Quiet Zone

Steve Featherstone, Popular Science, Apr 13, 2015 16, 2015

Excerpts

"According to the World Health Organization (WHO), EHS is not a medical diagnosis, but rather a vague set of symptoms with no apparent physiological basis. Even so, the condition--whatever its cause--appears to be widespread. Olle Johansson, an associate professor of neuroscience at the Karolinska Institute in Sweden, says the number of people who claim to have EHS varies by country, from 8 percent of the population in Germany to 3.5 percent, or about 11 million people, in the U.S."

"There are few epidemic diseases this large," Johansson says. "Nowadays, wherever you live, whatever you do, you're whole-body exposed, 24/7."

"As palpable as Jane's symptoms are to her--and as certain as she is that they're caused by EMR--scientific consensus disagrees. Almost universally, scientists hold that most EMR has no adverse health effects at the levels people typically encounter. And no study has ever definitively linked EHS symptoms to RF radiation, a type of electromagnetic radiation that originates from wireless devices, such as Wi-Fi routers, cellphones, base stations, or Bluetooth antennas. "Health agencies have repeatedly waded through the scientific literature," says Kenneth Foster, professor of bioengineering at the University of Pennsylvania, "and they don't see any clear evidence that there's a problem other than if you put a rat in a microwave oven, it's bad for the rat."

"The only recognized health risk from RF radiation is the heating of tissue (as in the rat in the microwave). In 1996, the Federal Communications Commission adopted a safety standard for RF-emitting devices based on thermal heating. That's why even though the standard is set far below levels recognized to cause harm, wireless companies still recommend not carrying your phone around in your pocket or sleeping with one too close to your head."

"According to Joel Moskowitz, the director of the Center for Family and Community Health at the University of California at Berkeley, the test for the thermal standard is outdated if not irrelevant. "It's not at all reflective of what the average user looks like today and not really of any user anywhere," he says. "It's not even the right measurement." Moskowitz believes that science hasn't caught up with the rapid proliferation of RF-emitting devices--from smartphones to smart meters--that have been spilling radiation into our homes, schools, and workplaces over the past two decades. Electrosensitives may be the proverbial canaries in the coal mine, he says. He cites a growing body of research that suggests RF exposure has many nonthermal biological effects, including damage to sperm cells and changes in brain chemistry.

"There are a lot of unanswered questions, obviously, but we clearly have evidence for precautionary health warnings," Moskowitz says."

"Without an official medical diagnosis, it's difficult for EHS sufferers to claim benefits from insurance companies and government health agencies. Only Sweden recognizes EHS as a functional impairment, equivalent to a disability. But activists are beginning to have an impact on attitudes toward EHS and EMR-related issues, such as the use of wireless networks in public schools. Some day they hope that the medical establishment will treat EHS like other mysterious syndromes, such as fibromyalgia. They won a moral victory in 2011, when the WHO classified RF radiation as "possibly carcinogenic" in response to its Interphone study, which found a 40 percent greater risk for certain brain tumors at the highest exposure levels. (Scientists, however, did not find an increased incidence in cellphone users overall.) Then, in February of this year, France restricted the use of RF devices in daycare centers, citing a precautionary approach to exposure. Those gains aside, few if any studies are taking seriously

the issue of EHS, and the inexorable expansion of wireless technologies does not appear to be slowing. Barring a breakdown in relations between electrosensitives and townsfolk or defunding of the GBT, Green Bank will continue to attract technological refugees searching for a safe haven from the electrosmog they feel is smothering the rest of the world."

"That's why I call [EHS] technological leprosy," Diane {Schou } said. "We can't be with other people in society. We have to live like lepers. Technology is wonderful stuff--if we aren't harmed by it."

This article was originally published in the April 2015 issue of Popular Science, under the title "Greetings From The Quiet Zone."

To read the entire article: <http://bit.ly/1LjN9ml>

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Is a toxicology model appropriate as a guide for biological research with electromagnetic fields?

My comments

The American neuroscientist, Allan H. Frey, published the first scientific paper that documented the microwave hearing effect in 1962. He published the first paper that documented leakage in the blood-brain barrier from exposure to microwave radiation in 1975. In the following letter from 1990, he discussed why the toxicology model is inappropriate for biologic research on electromagnetic fields.

Twenty-five years later, we have yet to fully comprehend this important message.

International guidelines and national regulatory standards assume a dose-response relationship exists between the power of an EMF exposure and the likelihood of a harmful health effect. However, biologic studies are finding harmful effects from sub-thermal exposures to microwave radiation at power levels that are a fraction of the regulatory limits.

Allan H. Frey. Letter to Editor: Is a toxicology model appropriate as a guide for biological research with electromagnetic fields? Journal of Bioelectricity. 9(2):233-234. 1990.

"... most people use a toxicology model as their frame of reference in the selection, funding, design and analysis of experiments. Data and theory show, however, that this is the wrong model (2-4). Thus much of the research has been inappropriate or irrelevant. This is one reason why hundreds of millions of dollars have been spent on EMF biological research with so little return for investment."

" ... living beings are electrochemical systems that use very low frequency EMFs in everything from protein folding through cellular communication to nervous system function."

" ... if we impose a very weak EMF signal on a living being, it has the possibility of interfering with normal function if it is properly tuned. This is the model that much biological data and theory tell us to use, not a toxicology model."

The letter can be viewed at: <http://bit.ly/AFrey1990>

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Is There a Connection Between Electrosensitivity and Electrosensibility? A Replication Study

My comments

The electromagnetically sensitive (ES) participants selected for the following study were based upon individuals' responses to a self-reported measure. Most ES participants did not experience severe symptoms so it may be inappropriate to consider them to have electromagnetic hypersensitivity (EHS).

Like other sham provocation studies, this study assumed that someone with ES knows when they are exposed to an electromagnetic field (EMF) and when they are not. The study protocol assumed that there is no lag between the exposure and the ability to detect the exposure (or the non-exposure).

The study also assumed that **all** ES participants would be affected by exposure to a 50 Hz magnetic field. However, it is likely that some people who experience ES may be sensitive to certain radio frequency fields, but not ELF magnetic fields.

Despite the questionable assumptions upon which this study was based, the ES participants were significantly ($p = .038$) more likely to detect an MF exposure than chance would dictate. This result replicated the finding of an earlier study.

Szemerszky R, Gubányi M, Árvai D, Dömötör Z, Köteles F. Is There a Connection Between Electrosensitivity and Electrosensibility? A Replication Study. *Int J Behav Med*. 2015 Mar 17. [Epub ahead of print]

Abstract

BACKGROUND: Among people with idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF), a better than random detection ability for a 50-Hz 0.5-mT magnetic field (MF) and a propensity to experience more symptoms than controls was reported in a previous study.

PURPOSE: The current study aimed to replicate and clarify these results using a modified experimental design.

METHOD: Participants of the provocation experiment were 49 individuals with self-reported IEI-EMF and 57 controls. They completed the questionnaires (symptom expectations, Somatosensory Amplification Scale-SSAS, radiation subscale of the Modern Health Worries Scale-MHWS Radiation) and attempted to detect the presence of the MF directed to their right arm in 20 subsequent 1-min sessions. Symptom reports were registered after each session.

RESULTS: Individuals with IEI-EMF as opposed to the control group showed a higher than random detection performance (d' index of signal detection theory), while no difference in their bias (β index) toward the presence of the MF was found. Predictors of reported symptoms were self-reported IEI-EMF and believed as opposed to actual presence of the MF. People with IEI-EMF reported significantly more symptoms particularly in the believed presence of the MF. IEI-EMF was closely related to MHWS Radiation and SSAS scores.

CONCLUSION: People with IEI-EMF might be able to detect the presence of the MF to a small extent; however, their symptom reports are connected to perceived exposure.

<https://www.ncbi.nlm.nih.gov/pubmed/25778471>

Electromagnetic hypersensitivity: EESC urges continuance of the precautionary principle through regulation and advisory work (Ref: 06/2015)

Press Release, European Economic and Social Committee (EESC), Jan 23, 2015

At its January plenary session, the EESC adopted an opinion on electromagnetic hypersensitivity syndrome (EHS) which recognises the distress being suffered by people in Europe who believe they are affected. The opinion, which was adopted by 136 votes to 110 with 19 abstentions, calls for sympathetic and appropriate treatment and support for this condition.

Although the EESC opinion says that radiofrequency exposure is not causally linked to EHS symptoms, it urges continuance of the precautionary principle through regulation and advisory work, particularly as further research is still needed to accumulate evidence concerning any potential health impact from long-term exposure.

The EESC opinion on electromagnetic hypersensitivity syndrome points out that further substantial research is ongoing to understand the problem and its causes. It also notes that the European Commission's Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) has performed an extensive analysis of this issue and will shortly be completing its latest opinion which draws on a broad public consultation. The opinion will soon be adopted and will be published on the SCENIHR website (http://ec.europa.eu/health/scientific_committees/emerging/index_en.htm).

<http://bit.ly/1BAvqz9>

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Public Hearing on Electromagnetic Hypersensitivity

Between 3 and 5 per cent of the population are electrosensitive according to the European Economic and Social Committee.

Electromagnetic hypersensitivity (EHS) is causing distress and loss of quality of life to a growing number of Europeans and according to new estimates, between 3 % and 5% of the population are electro-sensitive. The most common sources of Electromagnetic Radiation (EMR) pollution are mobile phone masts, cordless phones and Wi-Fi routers installed in the homes. All these emit microwaves permanently (24/7) in the places where they are installed.

The European Economic and Social Committee (EESC) study group on electromagnetic hypersensitivity (EHS) will hold a public Hearing on EHS on Tuesday, November 4, 2014 in Brussels, Belgium.

This event will gather all relevant stakeholders from a broad range of European civil society for a debate on how to deal with this issues at EU level and to give input for the future EESC's opinion that is scheduled for adoption in January 2015.

The EESC is a consultative body of the European Union that gives representatives of Europe's socio-occupational interest groups and others, a formal platform to express their points of views on EU issues.

<http://bit.ly/1tFQcLd>

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EESC opinion: Exposure of workers to the risks arising from physical agents (electromagnetic fields)

European Economic and Social Committee, Dec 7, 2011

Proposal for a directive of the European Parliament and of the Council on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)

Key points

- The EESC recommends that this directive be adopted and implemented in the legislation of Member States as soon as possible.
- However, the Committee is in favour of a precautionary approach being adopted without delay, given the risks of the non-thermal biological effects of emissions from electromagnetic fields. The long-term health of workers must be completely guaranteed at a high level through the introduction of the best available technologies at economically acceptable costs. The Committee expects a relevant provision to be incorporated into the directive.
- The EESC supports the Commission's initiative to fix thresholds so as to make this precautionary approach effective and credible; however, to ensure that this is absolutely effective it advocates fixed thresholds based on the thresholds applied when Directive 2004/40/EC was transposed (by Austria, the Czech Republic, Slovakia, Lithuania, Latvia, Estonia and Italy).
- The Committee stresses the need to strengthen the independence of scientific bodies involved in determining thresholds for workers' exposure to electromagnetic radiation, its effects and its consequences for public health, and in establishing measures to protect the health of workers exposed to this radiation. It is essential to put a stop to conflicts of interest among members of these bodies, linked to the financing of their research and their appointment (procedures and calls for tender, use of independent public research institutes).
- The Committee concedes the need for a derogation for professions using magnetic resonance imaging (MRI) for medical purposes, which should however be subject to a time limit and accompanied by

additional resources for research into new technologies to protect workers from the effects of electromagnetic fields and alternative techniques. Workers subject to the derogation should be covered by enhanced measures to protect them, special medical supervision and civil liability insurance to cover errors in the execution of their work arising from strong exposure to electromagnetic fields. The Committee also feels that the above-mentioned principles should be applied not only to medical workers, but also to all other workers who may be excluded from the general principles of the directive on the basis of the derogation included in Article 3 of the proposal.

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Study of self-reported hypersensitivity to electromagnetic fields in California

Levallois P, Neutra R, Lee G, Hristova L. Study of self-reported hypersensitivity to electromagnetic fields in California. *Environ Health Perspect.* 2002 Aug;110 Suppl 4:619-23.

Abstract

Cases of alleged hypersensitivity to electromagnetic fields (EMFs) have been reported for more than 20 years, and some authors have suggested some connection with the "multiple chemical sensitivity" illness. We report the results of a telephone survey among a sample of 2,072 Californians. **Being "allergic or very sensitive" to being near electrical devices was reported by 68 subjects, resulting in an adjusted prevalence of 3.2%** (95% confidence interval = 2.8, 3.7). Twenty-seven subjects (1.3%) reported sensitivity to electrical devices but no sensitivity to chemicals. Characteristics of the people reporting hypersensitivity to EMFs were generally different from those of people reporting being allergic to everyday chemicals. Alleging environmental illness or multiple chemical sensitivity diagnosed by a doctor was the strongest predictor of reporting being hypersensitive to EMFs in this population. Other predictive factors apart from self-reporting chemical sensitivity were race/ethnicity other than White, Black, or Hispanic; having low income; and being unable to work. The perception of risk of exposure to EMFs through the use of hair dryers (vs. exposure to power and distribution lines) was the factor the most associated with self-reporting about hypersensitivity to EMFs. However, risk perception was not sufficient to explain the characteristics of people reporting this disorder.

Open Access Paper: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241215/>

Additional Resources

Updated: May, 2019

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